

# Fit-for-purpose: developing curriculum for meeting the needs of public health leaders in the 21<sup>st</sup> century

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## Abstract

Although leadership is a well-known concept within organisational science, public health leadership is still not well-defined. Further, leadership is not commonly included in most public health training programs. Faced with immense changes in population health needs, public health professionals require a broader range of skills and expertise than ever before. In response to these issues the article aims to describe the development of a public health leadership curriculum as part of the European project entitled “Leaders for European Public Health” (LEPHIE) supported by the European Commission Lifelong Learning Programme. The article first discusses the theoretical underpinnings related to the public health leadership curriculum development. Secondly, its mission and objectives will be discussed. Thirdly, the methodological approaches and architecture of the programme are presented, and finally illustrates the features for quality assurance and the potential for future use in different contexts.

**Key words:** blended learning, curriculum, leadership, problem-based learning (PBL), public health

**Słowa kluczowe:** curriculum, nauczanie za pomocą mieszania metod online i stacjonarnych (*blended learning*), nauczanie oparte na problemach (PBL), przywództwo, zdrowie publiczne

## Introduction

Since the American-based Institute of Medicine proclaimed in its 1988 report ‘The Future of Public Health’ that “today, the need for leaders is too great to leave their emergence to chance,” [1] public health leadership has begun to gain a more prominent role as a part of the discipline of public health. [2] However, although leadership is a well-known concept within organisational science, public health leadership has still not been well-defined. The World Health Organisation (WHO) Regional Of-

fice for Europe recently developed a list of 10 Essential Public Health Operations (EPHO) in which “Leadership, governance and initiation, development and planning of public health policy” were included as core components [3] and “Strategic leadership for health” was also mentioned among the ten key areas of public health practice. Another WHO report acknowledges that contemporary health improvement is more complex than ever before and requires leadership that is “more fluid, multilevel, multi-stakeholder and adaptive” [4] rather than of a traditional command and control management variety. [4]

Today's public health professionals therefore need to be able to lead in contexts where there is considerable uncertainty and ambiguity, and where there is often imperfect evidence and an absence of agreement about both the precise nature of the problem and the solutions to it. [5] These documents point to the emerging realisation of the vital role of leadership and governance in public health. Indeed, the presence of competent leaders is crucial to achieve progress in the field. "We must be led by those who have the mastery of the skills to mobilize, coordinate and direct broad collaborative actions within the complex public health system." [6]

A number of studies have identified the capability of effective leaders in dealing with the complexity of introducing new innovations or evidence-based practice more successfully [7–9]. However organisations and professionals worry about the capacity of future public health leaders [10] and policymakers are concerned about the future responsiveness of the discipline [10] due to a lack of formal public health education generally among public health leaders [11] and the increasing variety of roles they are expected to fulfil. [10] According to a recent debate on public health leadership in the "Lancet", [12–14] leadership is still not commonly included in most public health training programs. [12] To develop effective public health leadership, therefore requires public health organisations to actively engage in developing more leaders at every level.

A key driver improving leadership within public health is that the nature of challenges faced by public health professionals is evolving. The combination of a range of socio-economic drivers includes aging populations and workforces, [15] globalisation, consumerism, individualism and economism; all of which have an effect on health and health-related issues. [16] Modern epidemics include: over consumption, [17] increasing social inequalities, [18] and rising rates of mental distress and disorder. [17] In Europe, these challenges are currently exacerbated by the impact of global recession and austerity measures introduced in many European countries [19] which are putting health systems under significant financial pressures and forcing them to deliver more with diminishing resources.

These immense changes demand new public health responses, which in turn, will require a broader range of skills and expertise for public health professionals. [20, 21] Public health initiatives now require coordinated, multi-disciplinary responses from a wider range of stakeholders than ever before to develop strong collaborative networks and teams at every level of the public health system, from politicians and policymakers to the general public and mass-media. The skills and competencies required by new public health professionals to create effective public health interventions in these complex health care settings will not be the traditional technical and academic skills long associated with public health alone. Public health professionals will also require the skills of effective leadership. [22, 23]

Healthcare policymakers in Europe have identified the development of leadership skills as pivotal to

delivering effective public health within this scenario. The rationale is that leadership skills are key to both the implementation of organisational changes necessary to improve the performance of healthcare systems, and to working successfully across traditional departmental, organisational, intersectoral and national boundaries to develop productive partnerships with a range of stakeholders, including service users and healthcare professionals, in order to develop impactful public health interventions.

Professional development of public health leaders therefore requires the instruction which is competency-based to help them develop the abilities to address complex and evolving demands of health care systems in order to improve the health of served populations. The development, acquisition and assessment of new skills should be supported by adequately tailored educational programs in order to improve health and tackle health inequalities, which are becoming a key priority for public health professionals and leaders. However, this is not an easy task as the European Union incorporates countries with unique cultural diversity and varied approaches to public health.

## Goal

In response to the issues outlined above, this article aims to describe the development of a public health leadership competency-based curriculum as part of a European project entitled "Leaders for European Public Health" (LEPHIE) supported by the European Commission Lifelong Learning (LLL) Programme. The article will discuss:

- 1) The theoretical underpinnings related to the public health leadership curriculum development.
- 2) The mission and objectives of the project.
- 3) The methodological approaches and architecture of the programme will be presented, and finally.
- 4) The quality assurance and potential for future use in different contexts.

## Theoretical underpinnings

Curriculum design can be defined as "the way the subject matter is conceptualised and how its major components are arranged, in order to provide direction for curriculum development." [24] The LEPHIE project aimed to develop a curriculum that would equip public health professionals with the leadership competencies they need to be effective. In order to achieve this, the project team had to ensure that the LEPHIE curriculum covered relevant leadership content, but presented it within relevant European public health context. Public health is broadly made up of a number of specific disciplines such as: methods in public health, population health and its social and economic determinants, population health and its material-physical, radiological, chemical and biological environmental determinants, health policy, economics, organisational theory and management, health promotion, health education health protection and disease prevention and ethics. [25] A starting point was to conceptualise

public health in a way that it was relevant to all European states. For this reason the project adopted the definition of public health in line with the ethos of EPHOs which constitute, “a set of fundamental actions that address determinants of health, and maintain and protect population health through organized efforts of society.” [21]

This allowed the team to incorporate real problems into the curriculum based upon European region public health priorities, such as; non-communicable diseases and ageing, into the curriculum by utilising Problem Based Learning (PBL) methods.

With regards to leadership, we also needed to develop an in-depth understanding of the nature of public health leadership. The team therefore undertook two literature reviews and qualitative research to understand the concept in detail. At the beginning of the project rapid literature review was undertaken, which aimed to develop a detailed working understanding of the nature of public health leadership, in order that a curriculum could be shaped for an initial pilot programme. [26] The leadership content was assured by the introduction of the leadership areas featured around systematically developed and evidence-based Public Health Leadership Framework, described elsewhere [27] consisting of 52 competencies distributed among eight domains: Systems Thinking, Political Leadership, Building & Leading Interdisciplinary Teams, Leadership and Communication, Leading Change, Emotional Intelligence & Leadership in Team-based Organisations, Leadership Organisational Learning & Development and Ethics and Professionalism. Recently additional domain: Global Values Leadership has been added to complete the area of contemporary leadership. [28] Each of the domains represents a separate session in the curriculum.

The competency framework serves as a foundation not only of the curriculum content but also as a self-assessment tool for the students. We would argue that leadership involves a set of interpersonal process skills, which are relevant across virtually all public health roles. However, they need to be applied appropriately according to the particular situation and context public health practitioners find themselves in.

### Mission and objectives of the LEPHIE programme

The international consortium led by Maastricht University (NL) included: Sheffield Hallam University (UK), Kaunas University of Health Sciences (LT), Medical University of Graz (A) and the Association of Schools of Public Health in the European Region (ASPHER) supported the collaborating institutions such as: Griffiths University (AUS), Canterbury Christ Church University (UK) and the Rethmeier Group (North Carolina Chapel Hill, US). The consortium aimed to develop a problem-based, blended-learning continuing education curriculum entitled Leadership for European Public Health. This competency-based educational programme provides a continuing education opportunity for graduates of public health studies or related disciplines and public health professionals who hold or will hold leadership positions

within their institutions or are aspire to taking a leadership role in the area of public health policy at the regional, national, and EU levels. The curriculum aims at the development, mastering and enhancement of leadership competencies excluding management skills. The following course objectives were set to guide the curriculum development process:

- “Examine the key debates around Leadership in Public Health in relationship to political, economic, social and, technological change and their implications for leaders within organisations.
- Introduce key theoretical frameworks that underpin leadership learning, and enable the critical use of this knowledge and understanding by applying theory to actual practice within the context of Public Health.
- Develop the ability to reflect on the Public Health leadership role and development needs of individuals.
- Stimulate self-assessment of leadership competencies by public health professionals.” [28]

The programme is an attempt to develop an integrated mutually recognised European Public Health leadership curriculum worth 7 ECTS supported by high standard educational materials including: Nominal Plan, Student Module Book and Teachers Handbook (**Figure 1**).<sup>1</sup>

### Methodological approaches and architecture of the programme

Since the LEPHIE curriculum is a complex, integrated and multidisciplinary continuing professional education offer we started with the assumption stemming from Merizow’s Transformative Learning Theory. According to this theory learning is “...the process by which we transform our taken-for-granted frames of reference (meaning perspectives, habits of mind, mind sets) to make them more inclusive, discriminating, open, emo-



**Figure 1.** Educational Materials: Nominal Plan, Student Module Book and Teacher’s Handbook.

Source: Book covers of educational materials based on Cza-banowska K., Smith T., et al., *Leadership for Public Health in Europe*. Nominal Plan, Maastricht University, Maastricht 2013.

tionally capable of change, and reflective so that they may generate beliefs and opinions that will prove more true or justified to guide action.” [29]

In order to fit the expectations of public health professionals with respect to the educational methods used and supported by the results of the survey [30, 31] we chose to use blended learning (BL) which is a combination of face-to-face and online teaching and PBL approaches.

A number of institutions offer BL routes in public health education, including Manchester Metropolitan University (UK), Tufts University (US), London School of Hygiene and Tropical Medicine (UK), Education for Health (UK) etc. The evidence [32] has indicated thus far that this mode of learning works well in public health education.

“...student satisfaction with the quality of this blended course was high. Large percentages of students indicated that they would recommend this course to others and would be willing to take another distance learning course in the future. The satisfaction level was related to students’ age and the number of previous distance learning courses that they had taken. Face-to-face interviews revealed that the success of this blended course was associated with the opportunities for face-to-face interaction and meaningful collaborative learning, the integration of technology components, and the course instructors”. [32]

PBL is used as the instructional model in the development and implementation of the leadership curriculum. Students work on tasks in small groups attempting to solve real problems. They are viewed as active participants in learning, rather than passive recipients of knowledge and take responsibility for and plan their own learning as they construct or reconstruct their knowledge networks. [33] Learning in PBL is also a collaborative process in which students have a common goal, share responsibilities, are mutually dependent on each other for their learning needs, and are able to reach agreement through open interaction. [33] Knowledge transfer can be facilitated by learning in meaningful contexts, and problem-based learning nurtures the ability of learners to solve real-life problems whilst fostering communication and cooperation among students. [34] PBL is also seen as highly impactful as an approach to LLL. Learning is contextual, collaborative, and constructive and the students can regulate their own learning. [34] During small group discussions online, the participants collaborate to come up with possible explanations for the problem. [33] Learners are required to use skills from different competency domains in order to solve any given problem. Understanding, in this context, develops knowledge of domains in a way that can be used frequently to assist in further problem solving. [35, 36]

Interactive lectures, tutorial group meetings and other collaborative session are offered to participants at a distance via a virtual learning environment such as Blackboard or Moodle, via which course material can be directly downloaded from the intranet (internal internet network). The combination of BL and PBL enables the participants to explore the main leadership theories in the context of public health by including a range of

activities for self-development and assessment, face to face contact, e-learning, project work, problem solving and self-directed learning, supervised by international content experts as tutors.

The program consists of two days of face-to-face introductory meetings and six consecutive on-line sessions including on-line lectures and tutorials.

Each of the online sessions is delivered from a different university as shown in **Figure 3**.

The learning takes place primarily online via Blackboard Collaborate, Elluminate and Skype, two main tools for online communication as shown in **Figure 4**.

The sessions in the module are built around the domains constituting public health leadership competency framework. *Systems Thinking, Political Leadership, Collaborative leadership: Building and Leading Interdisciplinary Teams, Leadership and Communication, Leading Change, Emotional Intelligence and Leadership in Team-based Organizations, Leadership, Organizational Learning and Development*. An additional elective session on *Global Public Health Values* has since been developed to support the horizontal dimension on *Ethics and Professionalism*. Due to the length of the course, compromise was needed as not all subjects identified in the literature could be covered in detail. Attempts were made to cover the topics that were identified in the literature as most important overall as well as most relevant to the context of European public health. Educational materials package consists of the Nominal Plan, Student Module book and Teacher Handbook together with supporting detailed documentation including session plans, literature, exercises, problems, on-line lectures and video interviews with public health leaders.<sup>2</sup> **Figure 2** shows the unique architecture of the programme which blends different forms of instruction, integrates teaching and learning from different European locations allowing for the collaborative and transformational learning of experts.

Within the educational programme these eight subject domains are covered in a series of sixteen taught sessions, two for each domain. Typically, in first of the two sessions the domain area is presented and defined by the lecturer, then explored by students via a real life problem scenario presented by the lecturer. By the end of the first session students are split into PBL “teams” who work independently to devise a strategy for researching the problem in detail and devising a workable solution. Team roles and tasks are allocated and after the session the teams continue to work on the problem independently for a period of two weeks to research the issues and devise solutions. In the second session the PBL teams report back their findings to the lecturer and the wider group. Leadership and team process issues are also discussed.

As a specific example, within the systems thinking and strategy sessions, students first gain an understanding of the nature of systems thinking and its importance for public health, through range of approaches including films, group discussions and lectures. In PBL teams they then research a specific disease area within an overall theme of chronic disease and ageing. The aim is to create a systems analysis of the multiple causalities and de-



Day	Location	Time	Subject	PBL Cases
Day 1	Residential	09.00	Welcome	
		09.30-10.00	Introduction to the module	
		10.00-11.00	Workshop: What is blended learning?	
		11.00-12.00	BL continued and Introduction to PBL	
		12.00-12.30	Break	
		12.30-17.00	What is Leadership?	<b>Pre-discussion Task 1</b> Sink or Swim?
		18.00-22.00	Group dinner	
Day 2	Residential	09.30-10.30	PBL feedback session	<b>Post-discussion Task 1</b>
		10.30-11.30	Systems Thinking	
		11.45-13.15	System Level Structural Health Interventions: CASE Study: The DECYPHER project (WHO healthy cities network)	<b>Task 2</b> A systems analysis of care for the elderly
		13.15-14.00	Group discussion and self-study assignment	
Session 1	Online	09.30-10.15	PBL Feedback session: Systems Thinking	
		10.30-12.30	Political Leadership	<b>Task 3</b> A Challenging Task
Session 2	Online	09.30-10.15	PBL Feedback session: Political Leadership	
		10.30-13.00	Building and Leading Interdisciplinary Teams	<b>Task 4</b> To lead or to manage?
Session 3	Online	09.30-10.15	PBL Feedback session: Building and Leading Interdisciplinary Teams	
		10.30-12.30	Leadership and Communication	<b>Task 5</b> Who will lead?
Session 4	Online	09.30-10.15	PBL Feedback session: Leadership and Communication	
		10.30-13.00	Leading Change	<b>Task 6</b> Making your institution a magnet care centre for evidence-based practice for the elderly
Session 5	Online	09.30-10.15	PBL Feedback session: Leading Change	
		10.30-13.00	Emotional Intelligence & Leadership in Team-based Organisations	<b>Task 7</b> Balancing the agendas of competing interest groups
Session 6	Online	09.30-10.15	PBL Feedback session: Emotional Intelligence & Leadership in Teams	
		10.30-12.30	Leadership, Organisational Learning and Development	<b>Task 8</b> To treat or not to treat? Is that the question?
Day 3	Residential	09.30-14.30	Assessment/ Delivery of Leadership presentations	
		15.00-15.30	Assignment 2 briefing	
		15.30-16.30	Module evaluation	
		17.00-21.00	Group Dinner	
			Submission of assignment 2	

**Figure 2.** The model timetable for “Leadership for European Public Health” curriculum.  
Source: Book covers of educational materials based on Czabanowska K., Smith T., et al., *Leadership for Public Health in Europe. Nominal Plan*, Maastricht University, Maastricht 2013.

pendencies in the disease area and from this to devise a Public Health strategy for more effectively dealing with the particular problem. Particular emphasis within the exercise is put upon gaining allocative efficiencies; i.e. the possibilities of developing strategies to prevent development and progression of the disease, rather than simply on disease management

Quality assurance

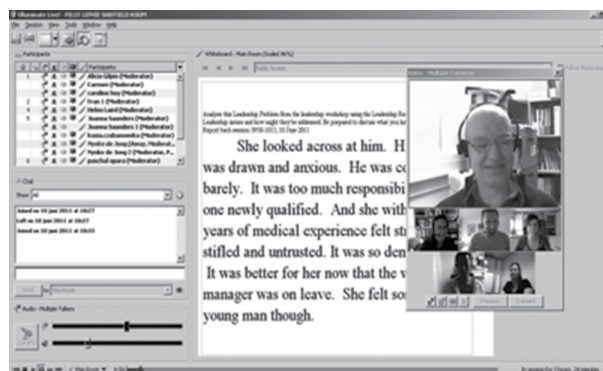
Developing an integrated educational public health leadership curriculum using a BL and PBL approach in which each session is delivered from a different institution requires a lot of team work and coordination. If not well structured, designed and supported by a clear and constructive communication, it can create disconnectedness amongst both teaching staff and participants. The content of the programme needs to be meaningful across various health care cultures and contexts, touch



**Figure 3.** Online collaboration of the educational institutions.  
Source: Book covers of educational materials based on Cza-banowska K., Smith T., et al., *Leadership for Public Health in Europe. Nominal Plan*, Maastricht University, Maastricht 2013.

upon current public health and health care issues and should be well reflected in the PBL problems and literature. In order to assure that these challenges are met the LEPHIE program was piloted four times and thoroughly evaluated. The first pilot was carried out by the Sheffield Hallam University on the group of Public Health professionals employed by NHS. The results helped improve the course and addressed weak points, such as an initial feeling by participants that the course was fragmented and lacked continuity. The Public Health Leadership curriculum was piloted and evaluated three more times in three different locations: Maastricht (NL), Kaunas (LT) and Graz (AT). There was a particular focus in the project of evaluating the use of PBL/BL approaches, in particular whether differences exist between the students from the different countries in these aspects. Standardised tests were also used to measure students' performance, satisfaction and effectiveness of the BL/PBL methods utilised. The competency framework was also used as a pre- and post- self-assessment study to evaluate self-perceptions of the development of leadership competencies. In the evaluation the researchers measured general programme satisfaction, quality of the course, functioning of the tutorial group, functioning of the tutors/teachers and quality of e-teaching. Data was collected at three time points: before the start of the course in the middle and at the end. [37] Results showed that one cannot underestimate the importance of providing adequate training in the VLE technologies used for both the staff and participants. The first teaching experiences using the VLE technologies were found to be critical for improving student engagement and continuing development of required user skills.

"I think the big difference is that there is little of the usual two way communication that one gets in a face-to-face teaching situation. You can see some people, via web-



**Figure 4.** Online sessions using Elluminate interface.  
Source: Lephie leadership Course: On-line session via Elluminate. (Copyright © Leaders for European Public Health (LEPHIE)) Published with the permission.

cams, and are aware that they are connected, but you do not receive any of the normal social cues that are usually delivered by body language: - people stopping their conversations before you begin; nods; eye contact; real time questions; shuffling in seats when it is getting time for a break, lack of energy. All these things that one takes for granted, but are a vital element of communication, are missing, and that feels distinctly odd."

"On the other side, one gets comfortable after a while in talking to the camera. - There are no interruptions. It feels like a performance: like one is delivering a speech, or a monologue."<sup>3</sup>

Generally, development of the BL/PBL leadership curriculum, its implementation and subsequent assessment have been a very rewarding experience for both for teachers and students. The evidence from the evaluation shows that the course not only developed the leadership competencies of the students but also provided a profound learning experience for the staff in delivering effective learning through innovative, new teaching and learning approaches. Transfer from the traditional teaching to the online teaching and using the elements of online-environment is a challenging task and to make it work well requires commitment, discipline and focus.

## Reflections and potential for future use in different contexts

The LEPHIE project was a first attempt to develop an integrated Public Health leadership curriculum in which each on-line session is delivered by different universities based on their interdisciplinary expertise. It is a very good example of optimising blended learning and problem based learning and the developed curriculum is clearly designed with busy professionals in mind.

The LEPHIE project successfully developed and piloted an innovative Public Health Leadership programme, validated at Masters level (7 ECTS) utilising BL/ PBL pedagogical approaches. The project was also successful in developing a better theoretical understanding of the nature of leadership in the field of Public Health. The pilot programme introduced leadership to public health practitioners and students, giving them a rounded understanding of the nature of leadership in public health and the potential benefits of utilising leadership approaches in understanding public health problems and collaboratively, devising, developing and implementing initiatives with broad groups of stakeholders. The evaluation did however identify tensions between leadership content and public health content. According to Yukl; "Leadership is the process of influencing others to understand and agree about what needs to be done and how it can be done effectively, and the process of facilitating individual and collective efforts to accomplish the shared objectives." [38] This behavioural process acts to maximise the goal direction, commitment, collaboration, motivation, satisfaction and effort of participants resulting in higher performance. [39] It is focused on the process of how people involved in work projects behave towards one another to work together effectively in pursuit of a particular goal. These disciplines relate to specific tasks that need to be undertaken to understand public health threats and opportunities. Whilst public health professionals may be competent in public health disciplines that allow them to understand public health problems, it is collaborating with diverse groups of stakeholders to develop and successfully implement effective public health interventions that is vital. In contemporary public health, as the nature of disease is becoming more complex, the interventions devised have to be more novel and will require the collaboration of a much more diverse range of actors. Leading these collaborations effectively is therefore a key to their success. It encompasses the core skills required for successful stakeholder collaboration, to devise, develop and implement the appropriate interventions.

In terms of the learning programme we have noticed some tensions between leadership content and public health content of the programme especially among experienced professionals. While the participants were taught leadership theory and practice and encouraged to utilise this theory in working in groups to analyse and solve public health problems, public health knowledge and skills represented somewhat of a comfort zone for them. The participants often resorted to working in the way they always did when it came to problem-based

work. The team therefore recognised the need to keep a strong focus on leadership theory and collaborative, interdisciplinary team-based problem solving to assure that there was meaningful and effective learning experience in relation to leadership development. In order to ensure that the focus of the learning remains clearly on leadership a number of changes to the programme will be implemented in the future course.

Students will receive early training in the practical application of collaborative, interdisciplinary, team leadership approaches which are the foundation of public health leadership practice. The completion of a "personal values" questionnaire prior to the start of the programme will ensure that students are fully able to articulate their core values and professional mission. Every student will receive a number of individual coaching sessions to both develop and discuss the contents of the questionnaire, and develop a vision of a public health project that they will commit to leading throughout their career in public health. Each student will also have the opportunity to practice coaching as part of a PBL activity with their peers.

The LEPHIE curriculum has a great potential and can be used in different public health and educational systems contexts. The problems touch upon broad areas and can be discussed based on diverse points of reference thus enriching the scope of public health leadership. Currently the programme has been implemented as a horizontal, critical thinking trajectory within Master of European Public Health Studies at the Faculty of Health Medicine and Life Sciences at Maastricht University and as a continuous professional development offer targeting public health and health related professionals outside the university. We will continue our efforts to develop the programme further and test it in different regions of the world enriching it with diverse leadership cultures and traditions.

## Conclusion

The article presents how an innovative public health leadership curriculum, which integrates public health content and leadership theories, uses problem based learning and online educational approaches. The proposed programme offers new educational and training solutions for continuous professional development targeting busy professionals. The aim is that the experience of learning leadership through blended learning approaches coupled with collaborative problem solving may result in the transformational learning needed by public health professionals to address complex and evolving health problems. The Leadership for Public Health programme can serve as a model for course designers in different educational contexts and can be further tested among public health students and professionals.

## Notes

<sup>1</sup> The books can be viewed at the project web page: [www.lephie.eu](http://www.lephie.eu).



<sup>2</sup> Fragments of the interviews can be watched at [www.lephie.eu](http://www.lephie.eu).

<sup>3</sup> Personal communication of two LEPHIE teachers taken after they delivered their first on-line session in May 2011.

## References

1. Institute of Medicine, *The Future of Medicine*, National Academy Press, Washington, D.C. 1988.
2. Koh H.K., Jacobson M., *Fostering public health leadership*, "J. Public Health" 2009; 3, 2: 199–201.
3. WHO Regional Office for Europe, *Strengthening Public Health Capacities and Services in Europe: A framework for Action. First meeting of the European Health Policy Forum for High-Level Government Officials*, Andorra, 9–11 March, 2011. Available at: [http://www.euro.who.int/\\_data/assets/pdf\\_file/0011/134300/09E\\_StrengtheningPublicHealthFramework\\_110452\\_eng.pdf](http://www.euro.who.int/_data/assets/pdf_file/0011/134300/09E_StrengtheningPublicHealthFramework_110452_eng.pdf); accessed: 12.06.2013.
4. World Health Organization Regional Office Europe, *HEALTH 2020 Leadership for health and well-being in 21st century Europe*. Available at: [http://www.who.int/workforcealliance/knowledge/resources/health2020\\_ngo\\_call/en/#](http://www.who.int/workforcealliance/knowledge/resources/health2020_ngo_call/en/#); accessed: 10.08.2013.
5. Heifetz R.A., Linsky M., Grashow A., *Practice of Adaptive Leadership: Tools and Tactics for Changing Your Organization and the World: A Fieldbook for Practitioners*, Harvard Business School Publishing, Boston MA 2009.
6. Institute of Medicine, *The Future of the Public's Health in the 21st Century*, National Academy of Sciences, Washington, D.C. 2002: 120.
7. Bennett L.M., Gadlin H., *Collaboration and Team Science: From Theory to Practice*, "Journal of Investigative Medicine" 2002; 60: 768–775.
8. Fink R., Thompson C.J., Bonnes D., *Overcoming barriers and promoting the use of research in practice*, "Journal of Nursing Administration" 2005; 35: 121–129.
9. Grimshaw J.M., Eccles M.P., Lavis J.N., Jill S.J., Squires J.E., *Knowledge translation of research findings*, "Implementation Science" 2012; 7: 50.
10. Wright K., Rowitz L., Merkl A., Reid M., Robinson G., Herzog B., et al., *Competency Development in Public Health Leadership*, "American Journal of Public Health" 2000; 90(8): 1202–1207.
11. Saleh S.S., Williams D., Balougan M., *Evaluating the Effectiveness of Public Health Leadership Training: The NEPHLI Experience*, "American Journal for Public Health" 2004; 94, 7: 1245–1249.
12. Czabanowska K., Smith T., Stankunas M., Avery M., Otok R., *Transforming public health specialists to public health leaders: the role of LEPHIE project*, "Lancet" 2013; 381(9865): 449–450.
13. Day M., Shickle D., Smith K., Zakariasen K., Oliver T., Moskol J., *Time for heroes: public health leadership in the 21st century*, "Lancet" 2012; 380(9849): 1205–1206.
14. Day M., Shickle D., Smith K., Zakariasen K., Oliver T., Moskol J., *Transforming public health specialists into public health leaders: authors' reply*, "Lancet" 2013; 381(9865): 450.
15. Hawley S.R., Romain T.S., Orr S.A., Molgaard C.A., Kabler B.S., *Competency-based impact of a state-wide public health leadership training program*, "Health Promotion Practice" 2011; 12(2): 202–208.
16. Hanlon P., Carlisle S., Hannah M., Lyon A., *The Future Public Health*, Open University Press, Maidenhead 2012.
17. Department of Innovation Universities and Skills, *Foresight Tackling Obesity: Future Choices*, October 2007; DIUS/PUB/2K/10/07/NP.
18. CSDH, *Closing the gap in a generation: health equity through action on the social determinants of health. Final Report of the Commission on Social Determinants of Health*, European Commission 2010.
19. Brand H., Rosenkoetter N., Clemens T., Michelsen K., *Austerity policies in Europe—bad for health*, "BMJ" 2013; 346: f3716.
20. World Health Organisation, *Strengthening public health capacities and services in Europe: a framework for action*, Regional Committee for Europe 61st session, Baku, Azerbaijan, 12–15 September 2011. EUR/RC61/10. 2011. Available at: <http://www.euro.who.int/en/>; accessed: 8.09.2012.
21. World Health Organisation. Regional Committee for Europe, *European Action Plan for Strengthening Public Health Capacities and Services* EUR/RC62/Conf.Doc./6 Rev. 2, Sixty-second session, Malta 2012. Available at: <http://www.euro.who.int/en/>; accessed: 10–13.08.2012.
22. Bjegovic-Mikanovic V., Vukovic D., Otok R., Czabanowska K., Laaser U., *Education and training of public health professionals in the European Region: variation and convergence*, "Int. J. Public Health" 2012; DOI: 10.1007/s00038-012-0425-.
23. World Health Organisation, Regional Office for Europe, *Strengthening Public Health Capacities and Services in Europe: A Framework for Action*, "Interim Draft" 2011. Available at: [http://www.euro.who.int/\\_data/assets/pdf\\_file/0011/134300/09E\\_StrengtheningPublicHealthFramework\\_110452\\_eng.pdf](http://www.euro.who.int/_data/assets/pdf_file/0011/134300/09E_StrengtheningPublicHealthFramework_110452_eng.pdf); accessed: 23.05.2013.
24. Zuga K.F., *Relating technology education tools to curriculum planning*, "Journal of Technology Education" 1989; 1, 1: 3.
25. Birt C., Foldspang A., *European core competences for MPH education (ECCMPHE)*, ASPHER, Brussels 2011.
26. Smith T., Stankunas M., Czabanowska K., De Jong N., O'Connor S., *Principles of all-inclusive public health: developing a Public Health Leadership curriculum*, "Public Health Journal" 2013.
27. Czabanowska K., Smith T., Könings K.D., Sumskaš L., Otok R., Bjegovic-Mikanovic V., Brand H., *In search for Public Health Leadership Competency Framework to support leadership curriculum – a consensus study*, "The European Journal of Public Health" 2013; doi: 10.1093/eurpub/ckt158.
28. Czabanowska K., Smith T., de Jong N., Fieldsend G., Lohrman C., O'Connor S., Johnson D., Michelsen K., Mundy T., Rethmeier K.A., Stankunas M., Sauliene S., Sumskaš L., Fahy N., Whitfield M., *Leadership for Public Health in Europe. Nominal Plan*, Maastricht University, Maastricht 2013.
29. Mezirow J., Associates. *Learning as Transformation, Critical Perspectives on a Theory in Progress*, Jossey-Bass Inc., San Francisco 2000.
30. Mikelska L., *The Supply and Demand of Public Health Courses in the Framework of Lifelong Learning in Europe*:



- A Questionnaire Study. Bachelor thesis*, Faculty of Health, Medicine and Life Sciences, Maastricht University, Maastricht 2009. Available from: [http://www.aspher.org/pliki/pdf/LLL\\_Liane.pdf](http://www.aspher.org/pliki/pdf/LLL_Liane.pdf); accessed: 25.09.2013.
31. Czabanowska K., Mikelska L., Brand H., *Supply and demand of Public Health courses in the framework of lifelong learning in Europe*, "Medicine & Health" October 2010–July 2012: 192–194.
  32. So Hyo-Jeong, *Is Blended Learning a Viable Option in Public Health Education? A Case Study of Student Satisfaction With a Blended Graduate Course*, "Journal of Public Health Management & Practice" January/February 2009; 15(1): 59–66; doi: 10.1097/01.PHH.0000342945.25833.1d.
  33. Dolmans D.H.J.M., De Grave W., Wolfhagen I.H.A.P., van der Vleuten C.P.M., *Problem based learning: Future challenges for educational practice and research*, "Medical Education" 2005; 39: 732–741.
  34. Dolmans D.H.J.M., Wolfhagen I.H.A.P., Van der Vleuten C.P.M., *Motivational and cognitive processes influencing tutorial groups*, "Academic Medicine" 1998; 73(10): 22–24.
  35. Suzuki Y., Niwa M., Shibata T., Takahashi Y., Chirasak K., Ariyawardana A., et al., *Internet-based Problem-based Learning: International Collaborative Learning Experiences*, in: Oon-Seng T. (ed.), *Problem-based Learning in eLearning Breakthroughs Singapore*, Seng Lee Press, Singapore 2007: 131–146.
  36. Hmelo-Silver C.E., *Problem-based learning: What and how do students learn?*, "Educational Psychology Review" 2004; 16: 235–266.
  37. Könings K.D., Spanjers I.A.E., van Merriënboer J.J.G., *Leadership for European Public Health Professionals. End Report Evaluation LEPHIE Module*, January 2013. [The results of the evaluation study will be available in the form of a publication].
  38. Youkl G., *Leadership in Organisations*, Pearson Prentice Hall, Upper Saddle River, Jn. 2006: 8.
  39. Avolio B., *The Great Leadership Migration to a Full Range Leadership Development System. KLSP: Transformational Leadership. Working Papers*, Academy of Leadership Press, California State University, Sacramento 1997.